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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Seong Deok Ahn

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7590

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EXAMINER

CHEN, KEATH T

ART UNIT

PAPER NUMBER

1792

MAIL DATE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/672,013	Applicant(s) AHN ET AL.	
	Examiner KEATH T. CHEN	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,6 and 8-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6 and 8-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/20/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/20/2008 has been entered.

Response to Amendment

1. The claim amendment filed on 09/17/2008, addressing rejection of claims 1, 2, 4, 6, and 8-14 from the final office action (06/20/2008) by amending claims 1 and 11 is entered, and will be addressed below.

Drawings

The drawings are objected to because valves 411 and 451 of Fig. 2 showing a symbol typically represents a power source, suggestion to change to valve symbol. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes

Art Unit: 1792

made to the brief description of the several views of the drawings for consistency.

Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 2, 4, 6, and 8-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 11 recites the limitations of "the transfer gas distributor is formed such that the transfer gas cannot be transmitted therethrough". There is lack of support of this limitation in the claim.

Claims 1 and 11 recites the limitations of "with an apex of the outer inclined surface connected to a rear end of a transfer gas transfer line" and "the transfer gas transfer line ... connect to the apex of the outer inclined surface of the transfer gas distributor". There is lack of support of this limitation in the claim. Specification merely stated "apex is aligned with the transfer gas inlet", page 5, lines 4-5. There is no discussion demarking the criticality of "connection" for the invention to function.

Claim 11 recites the limitation of "the transfer gas inlet ... formed at a circumference of the rear end ...", there is lack of support of this limitation.

3. Claims 1, 2, 4, 6, and 8-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 11 recites the limitations of "with an apex of the outer inclined surface connected to a rear end of a transfer gas transfer line" and "the transfer gas transfer line ... connect to the apex of the outer inclined surface of the transfer gas distributor". It is not clear what "connect" means: physically fastened, integrated, or physically separated while allowing gas to pass from one component to another.

Claims 1 and 11 will be examined with all the above possible explanation, a broadest reasonable interpretation.

The term "several hours" in claim 14 is a relative term which renders the claim indefinite. The term "several" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Art Unit: 1792

Claim 14 will be examined as any number of hours, as there is no indication of "how many" is "too many" in the meaning of "several".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1, 4, 6, 8, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Randive et al. (US 6789789, hereafter '789), in view of Nishikawa (US 6277201, hereafter '201).

'789 teaches some limitations of:

Claim 1: An apparatus (Fig. 1) using vapor phase deposition comprising: a deposition part (fig. 1), which comprises: a process chamber (reactor #12); a substrate holder, installed in the process chamber (CVD processing chamber intrinsically has a substrate holder for processing substrate, col. 3, lines 54-67) for supporting a loaded substrate (#16); and a shower head (injector plate/diffuser #32, col. 4, lines 8-9)

Art Unit: 1792

installed opposite the substrate holder in the process chamber to uniformly distribute organic source vapors (col. 4, lines 14-15, however, "organic" is intended use) to be used for a deposition reaction onto the substrate (col. 4, lines 7-12); and a source part (vaporizer #30), which comprises: a source chamber (vaporizer body #60, Fig. 4) for generating organic source vapors to be supplied to the shower head (as shown in Fig. 1); a transfer gas supply source (#26, carrier gas, col. 4, line 2) for supplying transfer gas that is used to transfer organic source vapors to the process chamber (as shown in Fig. 1); a source heater (heating elements not shown, col. 4, lines 43-45) which surrounds the source chamber and allows organic materials to evaporate to be organic source vapors in the source chamber (col. 5, lines 3-7); a transfer gas distributor (splash cone #86, Fig. 4, col. 5, line 47) installed in the source chamber (#60), wherein the transfer gas distributor is a conic block or a conic plate having an outer inclined surface facing an inner surface of the source chamber (as shown in Fig. 4), with an apex of the outer inclined surface connected to a rear end of a transfer gas transfer line (the transfer line include #44, #74 and gas plenum above #74), and wherein the transfer gas distributor is formed such that the transfer gas cannot be transmitted therethrough (col. 6, lines 59-61) and the transfer gas is distributed widely along the outer inclined surface of the conic block or the conic plate; a diluted gas supply source (preheated carrier gas #46 and/or #48, col. 4, lines 39-41, Figs. 1 and 4), from which diluted gas is supplied to combine with the transfer gas before the transfer gas enters the process chamber in order to control pressure of the process chamber; and the transfer gas transfer line having an elongated shape (the plenum above #73 is elongated shape) that

Art Unit: 1792

longitudinally extends from the transfer gas supply source into the source chamber to connect to the apex of the outer inclined surface of the transfer gas distributor (as shown in Fig. 4), a circumference of the rear end of the transfer gas transfer line including a transfer gas inlet (#74) which is formed by a first plurality of holes (#74 is porous frit, col. 5, line 22, having a plurality of holes) to allow the transfer gas to enter the source chamber for distribution by the transfer gas distributor; and an organic source vapor transfer line (#80, see Fig. 1) extended from inside the source chamber (see Fig. 4) to the shower head, a front end of the organic source vapor transfer line extended into the source chamber and including an organic source vapor outlet (#78, col. 5, line 41 and posts #88, col. 5, line 51, Fig. 4), the organic source vapor outlet formed by a second plurality of holes (gaps #90 between the posts #88, col. 5, line 52), the second plurality of holes to allow the organic source vapors distributed by the transfer gas distributor to exit the source chamber.

Claim 11: A method using organic vapor phase deposition comprising: generating first organic source vapors by heating a source chamber (vaporizer #60, Fig. 4) containing a first organic source material (from #24, col. 4, line 1); delivering a transfer gas, which is supplied from a transfer gas supply source (#26, carrier gas, col. 4, line 2), into the source chamber via a transfer gas inlet (#74) of a transfer gas transfer line (the transfer line include #44, #74 and gas plenum above #74), wherein the transfer gas (#26) is distributed to the source chamber by a transfer gas distributor (splash cone #86, Fig. 4, col. 5, line 47) installed in the source chamber (#60), wherein the transfer gas distributor is a conic block or a conic plate having an outer inclined surface facing

Art Unit: 1792

an inner surface of the source chamber (as shown in Fig. 4), with an apex of the outer inclined surface connected to a rear end of the transfer gas transfer line (as shown in Fig. 4), and wherein the transfer gas distributor is formed such that the transfer gas cannot be transmitted therethrough (col. 6, lines 59-61) and the transfer gas is distributed widely along the outer inclined surface of the conic block or the conic plate the transfer gas; transferring the first organic source vapors (#24) by the transfer gas (#26 carries #24), via an organic source vapor transfer line (#80), from the source chamber to a shower head of a process chamber (as shown in Fig. 1); combining diluted gas (from #36 or #38) with the transfer gas (#24 plus #26) before the transfer gas enters the process chamber in order to control pressure of the process chamber; causing a deposition reaction by distributing the first organic source vapors transferred via the shower head onto a substrate (col. 4, lines 9-12) that is loaded at a position opposite the shower head; wherein the transfer gas enters the source chamber through the transfer gas inlet (#74), the transfer gas inlet including a first plurality of holes (#74 is porous frit, col. 5, line 22, having a plurality of holes, including circumference of the inlet #74) formed at a circumference of the rear end of the transfer gas transfer line, the transfer gas transfer line having an elongated shape (the plenum above #73 is elongated shape) that longitudinally extends into the source chamber (that does extend into the longitudinal direction) to connect to the apex of the outer inclined surface of the transfer gas distributor (as shown in Fig. 4), and the transfer gas exits the source chamber through an organic source vapor outlet (#80) formed by a second plurality of

Art Unit: 1792

holes (gaps #90 between the posts #88, col. 5, line 52) at a front end of the organic source vapor transfer line that extends into the source chamber.

'789 does not explicitly teaches other limitations of:

Claim 1: a substrate temperature controller installed in the substrate holder for controlling the temperature of the substrate.

Claim 11: purging the process chamber after the vapor deposition is completed.

'201 is an analogous art in the field of CVD with liquid-source vaporization system (field of the invention). '201 teaches a susceptor (#32, Fig. 1, col. 4, lines 15-18) with heater/temperature controller to maintain temperature of the wafer (for claim 1). '201 further teaches to purge the reaction after film formation is completed (col. 6, lines 5-9) (for claim 11).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a heater to the susceptor, as taught by '201, to the apparatus in Fig. 1 of '789; and to purge the process chamber after deposition, for the purpose/motivation of maintain temperature of the wafer, as taught by '201 (col. 4, ines 15-18).

'789 further teaches the limitations of:

Claim 4: The apparatus of claim 1, wherein the transfer gas distributor (#86) distributes source gas fed from the transfer gas inlet (#74).

Claim 6: The apparatus of claim 1, wherein the source heater is expanded to surround the organic source vapor transfer line (as source vapor transfer line #80 extends from inside the heated source chamber, the heater for the source chamber also heat source vapor transfer, not the claim does not limit heating the entire source vapor transfer line, neither Applicant's heater #500 in Fig. 2 heat the entire line).

The above combination further teaches the limitations of:

Claim 8: The apparatus of claim 1, further comprising a regulator for controlling the flow rate and speed of fluids fed into the process chamber (either the valves of '789, for example metering valve #42; or the valves '201, particularly #38, col. 5, line 60, regulate flow rate).

The apparatus is intrinsically used repeatedly, at least for processing wafer repeatedly. Therefore, '201 further teaches:

Claim 12: The method of claim 11, further comprising sequentially repeating causing a deposition reaction and purging the process chamber (col. 6, lines 5-9).

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over '789 and '201, further in view of Nguyen (US 6444039, hereafter '039).

'789 and '201, together, teach all limitations of claim 1, as discussed above.

'789 and '201, together, do not teach the limitation of:

Art Unit: 1792

Claim 2: The apparatus of claim 1, further comprising a shower curtain, which is installed between the shower head and the substrate holder to surround the substrate holder.

'039 is an analogous art in the field of CVD (col. 1, line 12), particularly in precursor delivery (field of the invention). '039 teaches a baffle guide/shower curtain (#9, Fig. 2, col. 2, lines 10-15) between the shower head (#6) and the substrate holder to surround the substrate holder (#1).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a baffle guide/shower curtain, as taught by '039, to the apparatus in the combination of '789 and '201, for the purpose/motivation to prevent precursor from diffusing too widely, as taught by '201 (col. 2, lines 10-15).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over '789 and '201, further in view of Aoki et al. (US 6439943, hereafter '943).

'789 and '201, together, teach all limitations of claim 1, as discussed above.

'789 and '201, together, do not explicitly teach the limitation of:

Claim 9: The apparatus of claim 1, comprising a plurality of source chambers for generating different types of organic source vapors and further comprising: a plurality of transfer lines, which are installed to allow different organic vapors to

Art Unit: 1792

sequentially enter the process chamber or bypass using time-division; and
a plurality of valves, which are installed to use the transfer lines by time-division.

Applicant's claim requirement "to sequentially enter the process chamber" is considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (*Walter*, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (*In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (*In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

'943 is an analogous art in the field of CVD (col. 3, lines 59-61) using vaporizer (col. 6, lines 8-13). '943 teaches two vaporizer (#52 #53, Fig. 5, col. 6, lines 8-13) for used of different compounds and intrinsically having valves to control each line for delivery of precursor.

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a plurality of source chamber/vaporizer for

Art Unit: 1792

different compounds, as taught by '943, and adding necessary valves for each lines, to the apparatus in the combination of '789 and '201. The motivation is to carry out the process described in '943.

'789 and '201, together, disclose the claimed invention except for a plurality of source chambers. It would have been an obvious matter of design choice to duplicate the number of source chambers, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '789, '201, and '943, further in view of Nguyen (US 5882416, hereafter '416).

'789, '201, and '943, together, teach all limitations of claim 9, as discussed above.

'789, '201, and '943, together, do not explicitly teach the limitation of:

Claim 10: The apparatus of claim 9, wherein the source heater is expanded to heat the transfer lines and the valves.

'416 is an analogous art in the field of CVD using vaporizer (col. 3, line 29). '416 teaches a thermal jacket (#168, Fig. 1) expanded to heat the transfer lines and the valves (as shown in Fig. 1, col. 10, lines 25-62).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a thermal jacket, as taught by '416, to the apparatus in the combination of '789, '201, and '943 for the purpose/motivation to raise the internal temperature of the conduit/transfer line (obviously to avoid condensation of precursor).

8. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over '789 and '201, further in view of '943 and Sneh (US 20030180458, hereafter '458).

'789 and '201, together, teaches all limitations of claim 11, as discussed above. '201 teaches mfurther teaches heat the vaporizer to designate temperature (col. 4, lines 50-52).

'789 and '201, together, does not explicitly teach the limitations of:

Claim 13: The method of claim 11, to form multi-component organic thin films, further comprising: forming second organic source vapors by heating an additional source chamber containing a second organic material; transferring the second organic source vapors via another transfer line, which is maintained at a constant temperature to prevent condensation of the second organic source vapors, to the shower head of the process chamber; causing a second deposition reaction by distributing the second organic source vapors transferred via the shower head onto the substrate that is loaded at a position opposite the shower head; and second-purging the process chamber after the second vapor deposition is conducted on the substrate.

Art Unit: 1792

Claim 14: The method of claim 13, wherein the first organic source vapors and the second organic source vapors are alternately supplied to the process chamber using time-division by about 0.01 second to several hours.

'943 is an analogous art as discussed above. '943 teaches two precursor source chambers.

'458 is an analogous art in the field of ALD using precursor ([0009]). '458 teaches ALD sequence of alternating first reactant, first purge, second reactant and second purge ([0036]) with ~0.6 seconds cycle time ([0013]).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the process, as taught by '458 by using the apparatus in the combination of '789, '201, and '943 (claim 9 above) for the purpose/motivation of performing the ALD process taught by '458.

Response to Arguments

Applicant's arguments filed 09/17/2008 have been fully considered but they are not persuasive.

9. In regarding to 35 USC 112 second paragraph rejection, Applicants' amendment overcome previous rejection. However, Applicants' amendment also raised issues in 35 USC 112 first and second paragraph rejection, see rejection above.

Art Unit: 1792

10. In regarding to prior arts, Applicants argue that Randive '789 does not have an elongated shape that longitudinally extends into the source chamber to connect to the apex of the transfer gas distributor and holes are not formed on a circumferences of the rear end of the transfer gas transfer line, see the second paragraph of page 8.

These arguments are not convincing.

The new examiner explains the detail mapping in the claim rejection above. Notice that the gas inlet is not just the porous plate #74, as implied by Applicants' argument. Rather, it is the passage leading to #74; the plenum above #74 is elongated shape that extends into the source chamber extends in a longitudinal direction (as well as in a width direction).

Conclusion

The prior art made of record in the previous action and not relied upon in this action is still considered pertinent to applicant's disclosure, particularly Ono (JP 2001-011634) and US 2003/0054099.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone

Art Unit: 1792

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1792

/Ram N Kackar/
Primary Examiner, Art Unit 1792